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PATENT APPLICATION

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July 8, 2003

John C. Hammar

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: D. Engwall *et al.*

Examiner: S. Staicovici

Appl. No.: 09/407,278

Art Unit: 1732

Filing Date: September 29, 1999

Docket: 96-234C

July 8, 2003

For: *Method for Making a Composite*

Assistant Commissioner for Patents

Attention: Board of Patent Appeals and Interferences

Washington, DC 20231

REPLY BRIEF

Sir:

Applicant files three copies of this Reply Brief within two months following the Examiner's Answer dated May 8, 2003. If Applicant owes any fee (including any fees under §1.17 or all required extension of time fees), please charge that fee to Deposit Account 02-2960. Please treat this paper (and any future reply) as incorporating a petition for extension of time for the appropriate length of time, in the event that an extension is required.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is The Boeing Company.

II. RELATED APPEALS AND INTERFERENCES

Applicant does not know of any other appeals or interferences that directly affect or will be directly affected by the Board's decision in this appeal.

III. STATUS OF CLAIMS

1. Claims pending: 17, 18, 28, 29 and 32 - 35

2. Claims canceled: None
3. Claims withdrawn from consideration but not canceled: 29 and 32 - 35
4. Claims allowed: None
5. Claims rejected: 17, 18 and 28
6. Claims on appeal: 17, 18 and 28

#### IV. STATUS OF AMENDMENTS

Applicant filed an Amendment After Final Rejection on December 20, 2002, which was not entered. A provisional Terminal Disclaimer, however, was entered.

#### V. SUMMARY OF INVENTION

The present invention relates to an improved process of fabricating tools for manufacturing composite parts from constituent elements, such as face skins or laminates, honeycomb core and resin preimpregnated fabric, that produces parts having greatly improved conformance to dimensional requirements. The hybrid tool and a process allows the constituent elements to be assembled, bonded and/or cured, and then machined, i.e. sculpted, trimmed and/or drilled, with great precision, all while on the hybrid tool in the original position. Only after all the manufacturing steps are the complete parts removed from the tool. The present invention also relates to an improved part that is assembled, cured, and machined on that same tool in the original position, having improved conformance to the dimensional requirements. The preferred parts are large segments of the nacelles of commercial transport aircraft, perhaps 20 feet long and 8 feet in diameter.

These features of the invention are attained in a hybrid tool which serves both as a form on which constituent materials are applied for bonding or curing into a part in a desired configuration, and for holding the bonded or cured materials in the originally applied position during subsequent machining of a peripheral edge of the part by a CNC machine tool while the lay-up tool is positioned on a bed of the machine tool. In the hybrid tool, the face sheet is made of composite material and is configured to a desired shape corresponding to one surface of the part to be made on the tool. The face sheet has reference plane whose orientation and height above the machine tool bed are specified in the part program. A substantially continuous groove in the face sheet of the hybrid tool opens in the facing surface. A base structure supports the face sheet to maintain the facing surface in the desired shape. The base structure has ground-engaging pads, each having a contact surface, together defining an "A" datum plane, by which the supporting structure contacts and is supported by the machine tool bed. Attachments on the face sheet support the face sheet on the supporting structure with the reference plane of the face sheet parallel to the "A" datum plane. The materials for the part are applied on the face sheet, are

bonded or cured, and edge trimmed thereon, all while on the face sheet in the originally applied position. The edge trimming is performed by a CNC machine tool following a part program to move a cutter extending into the groove to engage the full thickness of the part. The groove corresponds in space to the position represented by the cutter path of travel in the part program by virtue of accurate relationship of the face sheet reference plane and the "A" datum plane.

## VI. ISSUES

Claims 17, 18 and 28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over US Patent 5,746,553 (*Engwall*) in view of US Patent 4,937,768 (*Carver*).

## VII. GROUPING OF CLAIMS

Each claim stands separately; arguments for the patentability of each claim appear in the Argument section.

## VIII. ARGUMENT

*Engwall* describes a tool that was a predecessor to that tool described and claimed in the present application. The present invention eliminates the need for costly tooling by using a master mold to make composite molding surfaces rather than Invar face sheets. Hybrid tools are much easier to make, cheaper to make, easier to change, and are able to produce as high a quality part as was made with the "dual purpose tools" that *Engwall* describes. Hybrid tools use a composite forming surface instead of Invar.

*Carver* describes an integrated assembly system using a master definition of the article being formed as a graphic data set in a 3-D graphics computer system. The data set includes coordinate points precisely locating the design definition.

*Engwall* should not be applied as a reference. The present application is a CIP of *Engwall*. Apart from that CIP status, the present application claims the benefit of US Provisional Patent Application 60/045,742, filed May 6, 1997. *Engwall* did not issue until May 5, 1998. While *Engwall* was filed on April 6, 1996, it and the present application are commonly assigned to The Boeing Company. As the Examiner points out, the law regarding the applicability of a reference under 102(e) was legislatively changed. If this application had a filing date after November 29, 1999, (which it could have, quite simply, by filing a Request for Continued Examination), *Engwall* would not be a reference. With that said, there is no reason that the law related to 102(e) should differ because of the filing date. A statute did not force the interpretation of 102(e) that was held prior to 11/29/99, but, now, a statute does say that such an

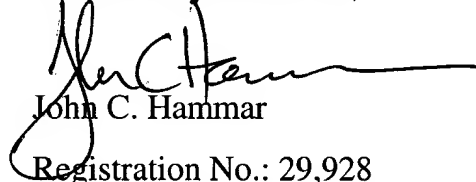
interpretation is no longer valid for inventions that are commonly assigned. Congress changed the rules and they should relate back without regard to the effective date of the enabling legislation. Otherwise, the Patent and Trademark Office merely extracts a penalty from the Applicant whose application spans the period when the law changed. A court would have no reason to follow precedent prior to 11/29/99, when the outcome has been legislatively changed. Accordingly, *Engwall* does not qualify as a reference. Congress changed the rule and the PTO should follow the change, irrespective of the filing date. Otherwise, the PTO places form over substance. If the Board decides to adhere to the rule, then Applicant simply will file a Request for Continued Examination, and gain benefit from the statutory change.

There is common inventorship as well as a common assignee.

Claim 17 requires a hybrid tool having a face sheet made from composite material. Claim 28 also requires that the hybrid tool have a face sheet made from a composite material made on a master tool. Claim 18 identifies that the face sheet is made from graphite/bismaleimide. *Engwall* teaches use of a graphite/epoxy facesheet. Epoxy is not bismaleimide. Epoxy cannot withstand as high a temperature as bismaleimide, so that the hybrid tools of the present invention are superior to and an improvement over those made with an epoxy face sheet.

Please reconsider the rejection based on obviousness both because *Engwall* is not a reference and, even if it is, the cited references do not render the claimed methods obvious.

Respectfully submitted,

  
John C. Hammar

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## IX. APPENDIX

*The appealed claims are:*

17. A method of manufacturing a composite part on a hybrid tool, comprising:  
coating a face sheet of a hybrid tool with a release agent, said face sheet made from a composite material made on a master tool, the composite material having a mold surface the same shape and size as a surface of said part;  
laying up plies of resin impregnated fabric material on said face sheet to a desired thickness;  
debulking said plies in a vacuum bag with gas pressure, and curing said resin to form said part on said face sheet;  
placing said hybrid tool on a machine tool bed at a position designated in a machine tool program using positioning devices;  
probing reference features on said hybrid tool to accurately establish the position of said face sheet relative to a home position of the machine tool, said reference features having been transferred from corresponding reference features on said master tool;  
normalizing said machine tool part program to correspond to the actual position of the hybrid tool on the machine tool bed as determined by said probing of said hybrid tool reference features;  
operating the machine tool to rotate a cutting tool while following a cutting path along and within a groove in said face sheet so that said cutting tool projects into said groove and engages the full thickness of said laid-up part on said hybrid tool face sheet for peripheral edge trimming of the part; and  
removing the trimmed part from the mold surface.

18. A method of manufacturing a composite part on a hybrid tool as defined in claim 17, wherein:  
said face sheet of said hybrid tool is made of graphite/bismaleimide.

28. A method of making a composite part on a hybrid tool:

coating a face sheet of a hybrid tool with a release agent, the face sheet made from a composite material made on a master tool, the composite material having a mold surface the same shape and size as a surface of the part;

laying up plies of resin impregnated fabric material on the face sheet to the desired thickness;

debulking the plies in a vacuum bag with gas pressure, and curing the resin to form the part on the face sheet;

placing the hybrid tool on a machine tool bed at a position designated in a machine tool program using spud and sine key;

probing reference features on the hybrid tool to accurately establish the position of the face sheet relative to a home position of the machine tool the reference features having been transferred from corresponding reference features on the master tool;

normalizing the machine tool part program to correspond to the actual position of the hybrid tool on the machine tool bed;

operating the machine tool to rotate a cutting tool while following a cutting path along and within a groove previously cut into said face sheet so that said cutting tool projects into said groove and engages the full thickness of the laid-up part in the tool face sheet for peripheral edge trimming of the part.



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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Paper No. 16

Application Number: 09/407,278  
Filing Date: September 29, 1999  
Appellant(s): ENGWALL ET AL.

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John C. Hammar  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed March 31, 2003.

**(1) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(2) *Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

**(3) *Status of Claims***

The statement of the status of the claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows:

This appeal involves claims 17, 18 and 28.

Claims 29 and 32-35 have been canceled in the After-Final amendment filed December 20, 2002 that has been entered in view of Appellants' remarks.

**(4) *Status of Amendments After Final***

The appellant's statement of the status of amendments after final rejection contained in the brief is incorrect.

In view of Appellants' remarks the amendment after final rejection filed on December 20, 2002 has been entered.

The Supplemental Declaration after final rejection filed on April 21, 2003 has been entered.

**(5) *Summary of Invention***

The summary of invention contained in the brief is correct.

**(6) *Issues***

The appellant's statement of the issues in the brief is correct.



**(7) Grouping of Claims**

Appellant's brief includes a statement that claims 17-18 and 28 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

**(8) Claims Appealed**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(9) Prior Art of Record**

5,746,553	ENGWALL	5-1998
4,937,768	CARVER et al.	6-1990

**(10) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

1. Claims 17-18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Engwall (US Patent No. 5,746,553) in view of Carver *et al.* (US Patent No. 4,937,7687).

Engwall ('553) teaches the claimed process for manufacturing a composite part on a hybrid tool including providing a hybrid tool (30) having a graphite/epoxy (composite) top plate (32) (face sheet) (see col. 3, lines 63-65) with top mold surface (60) configured to a desired shape of one surface of the resulting composite part (said face sheet...having a mold surface the same shape and size as a surface of the part) (col. 4, lines 49-52), applying a release coating to said top surface (60) (col. 4, lines 34-35), laying up a plurality of resin impregnated plies onto said top surface (60) of top plate (32) to form a laid-up assembly, applying a vacuum bag over said laid-up assembly and sealing peripheral regions of said vacuum bag around said laid-up assembly, evacuating air from under said vacuum bag to cause air pressure outside said vacuum

bag to press said vacuum bag against said laid-up assembly and bonding/curing said resin to from said composite part (col. 6, lines 33-65).

Further, Engwall ('553) teaches removing said vacuum bag, uncovering said molded composite part, fixing said hybrid tool and molded composite part in a known position on a CNC machine tool bed (42) using provided location and attachment devices for accurately indexing and positioning tool (30) on the base 42 of the CNC machine tool. Further, Engwall ('553) teaches that retractable feet (94) on the support structure (34) of the tool (30) are retracted to engage a datum surface (96) on the underside of the support structure (34) with the machine tool bed (42), hence establishing the vertical position of the facing surface (60) of the tool (30) from the machine bed (42), which is a distance "known" to the machine program that controls the movement of the CNC mounted machine tool (44) (col. 7, lines 1-13) (probing reference features on said hybrid tool to accurately establish the position of said face sheet relative to a home position of the machine tool). It should be noted that the position and the orientation of the tool (30) on the machine bed (42) are established by location devices, including a set point (98) and a sine key (100) (col. 7, lines 13-16). Further, the position information of the machine tool (30) on the machine base (42) together with a tool configuration data set and part configuration data set are then input into the machine tool controller (46) (normalizing said machine tool part program to correspond to the actual position of the hybrid tool on the machine tool bed as determined by said probing of said hybrid tool reference features) in order to provide sufficient information to enable the machine tool controller (46) to guide the machine tool to perform the required cutting operations, including guiding a cutter around a peripheral groove (62), said cutter projecting into said peripheral

groove and engaging the full thickness of said molded composite part to cut the peripheral edge (col. 3, lines 3-10). It should be noted that since Engwall ('553) specifically teaches that the orientation and alignment of the tool (30) is known in relation to the machine bed (42), then it is submitted that the orientation and alignment of the surface (60), which is the top surface of tool (30), is also known in relation to the machine bed (42). Furthermore, Engwall ('553) teaches trimming the edges of the resulting composite article and removing said resulting composite article from said tool.

Regarding claim 17, Engwall ('553) does not teach that a master mold having reference features thereon is used to form the top cover plate (32) (face sheet). Carver *et al.* ('768) teach the use of a fiber composite master mold to form a bond tool having trim lines, drilling patterns and surface locators (reference features) thereon (col. 5, lines 67-68). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a master mold to form a bond tool (top plate (32)) as taught by Carver *et al.* ('768) in the process of Engwall ('553) because, Carver *et al.* ('768) specifically teach that a master mold can be used to form a bond tool, whereas Engwall ('553) teaches the use of a bond tool in molding a composite part, and also because both references teach similar materials and bonding processes.

In regard to claim 18, Engwall ('553) teaches that top plate (32) (face sheet) is a carbon fiber/epoxy resin (graphite/bismaleimide) composite material (col. 3, line 64).

Specifically regarding claim 28, Engwall ('553) teaches a sine key (100). Further, Engwall ('553) teaches a set point (98) including a plate (102) having a vertical hole (104) and a pin (106) fitting into said hole (104) (spud) (col. 7, lines 15-23).

**(11) Response to Argument**

Appellants argue that “*Engwall* fails to teach or to suggest a tool having a composite material as the mold surface” because, “the tool uses an Invar metal forming surface” and, “*Carver* fails to cure the deficiencies of *Engwall*” (see page 3, section VIII, of Appellants’ Brief filed March 31, 2003).

In response to Appellants’ arguments against the references individually, it should be noted that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Further, as shown throughout prosecution of the instant application, Engwall (‘553) specifically teaches in col. 3, lines 63-65, a graphite/epoxy (composite) tool. Furthermore, Engwall (‘553) specifically teaches the use of either Invar or a carbon fiber/epoxy resin composite material as equivalent alternatives for top plate (32) (see col. 3, lines 63-65).

Appellants argue that “*Engwall* is not properly applied as a reference” because the “present application is a CIP of *Engwall*” and that *Engwall* and the “present application are commonly assigned to the Boeing Company” (see pages 3-4, section VIII, of Appellants’ Brief filed March 31, 2003).

In response, the following procedural history summary is provided for the instant application and for the Engwall (‘553) reference:

(a) Engwall (‘553) has an effective filing date of April 8, 1996 and a publishing date of May 5, 1998;

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(b) the instant application is a divisional application of US Serial No. 09/072,716 filed May 5, 1998, now US Patent No. 6,012,883, which claims priority from US provisional application 60/045,742 filed on May 6, 1997;

(c) the instant application is also a continuation-in-part application of Engwall ('553).

Therefore, in view of (a) and (b), since the effective filing date of Engwall ('553) is prior to the effective filing date of the instant application and the publishing date of Engwall ('553) is after the effective filing date of the instant application, it submitted that Engwall ('553) qualifies as prior art under 35 U.S.C. 102(e)/103.

Regarding (c), although Appellants have perfected priority in the After-Final amendment filed December 20, 2002 to claim that the instant application is a "CIP of *Engwall*," it should be noted that the instant application and Engwall ('553) have different inventive entities and, according to MPEP §2136.04, the fact that the instant application and Engwall ('553) have one common inventor is immaterial. Ex parte DesOrmeaux, 25 USPQ2d 2040 (Bd. Pat. App. & Inter. 1992) (The examiner made a 35 U.S.C. 102(e) rejection based on an issued U.S. patent to three inventors. The rejected application was a continuation- in-part of the issued parent with an extra inventor. The Board found that the patent was "by another" and thus could be used in a 35 U.S.C. 102(e) /103 rejection of the application.). Although in Applied Materials Inc. v. Gemini Research Corp., 835 F.2d 279, 15 USPQ2d 1816 (Fed. Cir. 1988) the court held that whether "an application has named a different inventive entity than a patent does not necessarily make that patent prior art," the issue "turns on what the evidence of record shows as to who invented the subject matter." In re Whittle, 454 F.2d 1193, 1195, 172 USPQ 535, 537 (CCPA 1972).

Specifically, MPEP §2136.05 explains that in “the situation where one application is first filed by inventor X and then a later application is filed by X & Y, it must be proven that the joint invention was made first, was thereafter described in the sole applicant’s patent, or \*\* was thereafter described in the sole applicant’s U.S. patent application publication or international application publication, and then the joint application was filed. In re Land, 368 F.2d 866, 151 USPQ 621 (CCPA 1966). In “*In re Land*, separate U.S. patents to Rogers and to Land were used to reject a joint application to Rogers and Land under 35 U.S.C. 102(e) /103,” whereas in the instant application, the separate Engwall (‘553) reference is used to reject a joint application of Engwall *et al.* under 102(e)/103. Therefore, it is submitted that Engwall (‘553) qualifies as prior art under 102(e)/103.

Further, in order to disqualify Engwall (‘553) as prior art under 102(e)/103, Appellants argue that “*Engwall* and the present application are commonly assigned to the Boeing Company” (see pages 3-4, section VIII, of Appellants’ brief filed March 31, 2003). However, as stated in MPEP §2136.02, only “for applications filed on or after November 29, 1999,” may a rejection under 35 U.S.C. 102(e)/103 be withdrawn “if the applicant provides evidence that the application and prior art reference were owned by the same person, or *subject to an obligation of assignment to the same person*, at the time the invention was made” (emphasis added). As noted throughout prosecution of the instant application, the instant application was filed on September 29, 1999 and as such, it is not affected by The Intellectual Property and High Technology Technical Amendments Act of 2002 (Pub. L. 107-273, 116 Stat. 1758 (2002) (see page 9 of the Final Rejection mailed October 21, 2002).

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Under MPEP §706.02(l)(2), the Appellants have “the burden of establishing that subject matter is disqualified as prior art under 35 U.S.C. 103(c)” by “establishing that it was commonly owned at the time the claimed invention was made.” Since the instant application was filed prior to November 29, 1999, Appellants’ mere statement that “*Engwall* and the present application are commonly assigned to the Boeing Company” (see pages 3-4, section VIII, of Appellants’ brief filed March 31, 2003) does not overcome the 35 U.S.C. 102(e)/103 rejection.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

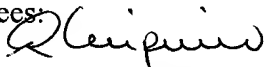
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April 30, 2003

4/30/03

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